

## CLAIMS

1. A method to determine the value of the resonant frequency of a resonant sensor subject to an acousto-mechanical and/or dielectric load, wherein said sensor is excited by at least a first electrical signal having a first frequency, characterized in that the sensor is constantly and simultaneously excited by at least a second electrical signal having a second frequency different and independent from said first frequency so as to compensate the parallel capacitance of the sensor in an automatic and continuous way.
- 10 2. A method according to claim 1, wherein said first frequency of said first electrical exciting signal of said sensor is constantly maintained to a value such that the phase of the impedance of said sensor is zero.
- 15 3. A method according to claim 1, wherein said second electrical signal at said second frequency is used to instantaneously determine the response due only to the parallel capacitance of said sensor.
4. A method according to claim 1, wherein said first frequency is the series resonant frequency of the sensor.
5. A method according to claim 1, wherein said second frequency is lower than the series resonant frequency of the sensor.
- 20 6. A method according to claim 1, wherein instantaneous detection is provided of at least one electrical quantity representative of the value of said compensated parallel capacitance.
7. A method according to claim 1, wherein instantaneous detection is provided of at least one electrical quantity representative of the value of the quality factor Q of said sensor.
- 25 8. A method according to claim 1, wherein said resonant sensor is a piezoelectric sensor.
9. A method according to claim 1, wherein said resonant sensor is

a piezoelectric quartz sensor.

10. 10. A method according to claim 1, wherein said resonant sensor is a piezoelectric AT-cut vibrating in Thickness-Shear Mode (TSM) quartz crystal sensor.
- 5 11. A device to determine the value of the resonant frequency of a resonant sensor subject to an acousto-mechanical and/or dielectric load, including at least one oscillator circuit having at least one first feedback section to excite said sensor with at least one first electrical signal having a first frequency, characterized in that at least one second feedback section is included to constantly and simultaneously excite said sensor with at least one second electrical signal having a second frequency different and independent from said first frequency so as to compensate the parallel capacitance of the sensor in an automatic and continuous way.
- 10 12. A device according to claim 11, wherein said resonant sensor is the frequency-controlling element of the frequency of said oscillator circuit.
- 15 13. A device according to claim 11, wherein said first frequency is the series resonant frequency of the sensor.
- 20 14. A device according to claim 11, wherein said second frequency is lower than the series resonant frequency of the sensor.
15. A device according to claim 11, wherein said first feedback section includes a first feedback loop that forms a phase-locked loop to follow the series resonant frequency of said sensor.
- 25 16. A device according to claim 11, wherein said second feedback section includes a second feedback loop that performs the automatic compensation of the parallel capacitance of said sensor.
17. A device according to claims 15 and 16, wherein said first feedback loop is coupled to said second feedback loop.

18. A device according to claim 11, wherein at least one section is included comprising a voltage-controlled variable capacitance.
19. A device according to claim 11, wherein at least one terminal of said resonant sensor is connected to ground.
- 5 20. A device according to claim 11, wherein said resonant sensor is a piezoelectric sensor.
21. A device according to claim 11, wherein said resonant sensor is a piezoelectric quartz sensor.
22. A device according to claim 11, wherein said resonant sensor is  
10 a piezoelectric AT-cut vibrating in Thickness-Shear Mode (TSM) quartz crystal sensor.